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Appl. No. 09/630,395  
Appeal Brief dated June 17, 2004  
Appendix C



## Transponder News

A news service reporting on developments regarding the use of radio based tagging transponder systems for commerce and scientific applications. Covering the RFID technologies, EAS technologies and magnetic coupled techniques.

### What are TRANSPONDERS

Transponders were originally electronic circuits that were attached to some item whose position or presence was to be determined. The Transponder functioned by replying to an interrogation request received from an interrogator, either by returning some data from the transponder such as an identity code or the value of a measurement, or returning the original properties of the signal received from the interrogator with virtually zero time delay, thereby allowing ranging measurements based on time of flight. As the interrogation signal is generally very powerful, and the returned signal is relatively weak, the returned signal would be swamped in the presence of the interrogation signal.

The functioning of the Transponder was therefore to move some property of the returned signal from that of the interrogation signal so that both could be detected simultaneously without the one swamping the other. The most common property to change is the transmission frequency meaning that the transponder might receive the interrogation frequency at one frequency, and respond on another frequency that is separated sufficiently with regard to frequency so that both may be detected simultaneously.

Transponders were initially used in World War 2 on aircraft to identify the aircraft using IFF (Identify Friend or Foe), where friendly aircraft would respond to secret preprogrammed interrogation codes and indicate to the radar operators that they were friendly aircraft. Today Transponders are still used extensively on commercial aircraft to relay to the radar operators the height and identity of the aircraft on their radar displays.

Another important use for transponders has been in the measurement of distance. Here the interrogator sends a signal to the transponder, which immediately responds on another frequency. By measuring the time from the sending of the initial signal by the interrogator, to the receipt of the signal from the transponder, and calculating the effective double path travelled using the speed of light, the distance between the transponder and the interrogator can be determined. The accuracy of such systems is limited to fractions of a meter using electromagnetic

<http://www.rapidtp.co.za/transponder/rfddbasi.html>

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propagation systems due to the limits in determining the transmission times with sufficient accuracy. (A system called Tellurometer invented in the 1960's improved this resolution over distances of 100's of kilometers to a few centimeters, but although this still used transponders, it was not based on the principle of time of flight).

Another major category of Transponders which is not the subject of this newspaper, is the use of transponders in radio relay systems such as fixed/mobile radio networks and satellite transmissions. The same principle applies in that the data is transmitted on a carrier frequency at one frequency, and rebroadcast on a carrier of another frequency, allowing the strong and weak signals to co-exist.

Transponder systems have recently started to become major players in the field of electronic identification. Within this application, it is necessary to make the transponders as cheap as possible, and to rather build the sophistication into the readers. This lack of sophistication generally means that changing the transmission frequency is no longer an option, as the frequency translation needs expensive and complex tuned circuitry. Instead the transponders have given up the ranging ability and rather time slice the communications channel with the interrogator. Here the interrogator (called a reader) sends an interrogation signal for a limited time. The transponder receives the signal and waits for its completion, and then responds on the same frequency with its identity and data code. (There are more complex methods but this covers the basics.)

The devices are sometimes called transponders and are also sometimes called *tags*, most probably because their end application eventually will be the tagging of goods.

Transponders vary in selling prices from \$1000 US down to \$0-20, depending on application and features.

### What are RFID systems

RFID stands for *radio frequency identification*. It is a widely varied collection of technologies for various applications, ranging from the high speed reading of railway containers to applications in retail that can be regarded as a potential successor to the barcoding technologies in use today. RFID is based around radio or electromagnetic propagation. This has the ability to allow energy to penetrate certain goods and read a tag that is not visible thereby to identify those goods remotely, either in the form of an identity code or more simply that something is present (EAS). Different frequencies of the radio system result in different reading ranges and properties of the system.

Commonly available tags have an operating frequency in the range from 60KHz to 5.8GHz depending on application.

In operation one can generally say that there are three different types of technologies being implemented. They are:

- Magnetic based RFID technologies
- EAS based technologies
- Electric field based RFID technologies

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Transponder news - What is RFID - What are transponders

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What is transponder? - A Word Definition From the Webopedia Computer Dictionary

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# transponder

A wireless communications device usually attached to a satellite. A transponder receives and transmits radio signals at a prescribed frequency range. After receiving the signal at a transponder will at the same time broadcast the signal at a different frequency. The term is a combination of the words *transmitter* and *responder*. Transponders are used in satellite communications and in location, identification and navigation systems.



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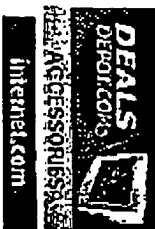
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## transponder

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**transponder:** 1. An automatic device that receives, amplifies, and retransmits a signal on a different frequency. 2. An automatic device that transmits a predetermined message in response to a predefined received signal. *Note:* An example of transponders is in identification-friend-or-foe systems and air-traffic-control secondary radar (beacon radar) systems. 3. A receiver-transmitter that will generate a reply signal upon proper interrogation. [JP1]

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This HTML version of Telecom Glossary 2K was last generated on Wed Feb 28 15:39:21 MST 2001. References can be found in the Foreword.

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# Transponder

From Wikipedia, the free encyclopedia.

In telecommunication, the term **transponder** has the following meanings:

- An automatic device that receives, amplifies, and retransmits a signal on a different frequency.
- An automatic device that transmits a predetermined message in response to a predefined received signal.
- A receiver-transmitter that will generate a reply signal upon proper electronic interrogation.

In particular, a communications satellite's channels are called transponders, because each is a separate transceiver or repeater. Older television satellites in the C band have 24 transponders, while newer Ku band ones have 32. With digital video data compression and multiplexing, several video and audio channels may travel through a single transponder on a single wideband carrier. Original analog video only has one channel per transponder, with subcarriers for audio and ATIS. Non-multiplexed radio stations can also travel in single channel per carrier (SCPC) mode, with multiple carriers (analog or digital) per transponder. This allows each station to transmit directly to the satellite, rather than paying for a whole transponder, or using landlines to send it to an earth station for multiplexing with other stations.

Another example of transponders is in identification friend or foe systems and air traffic control secondary radar (beacon radar) systems.

*Source: partly from Federal Standard 1037C and from MIL-STD-188 and from the Department of Defense Dictionary of Military and Associated Terms*

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